

Application No. 09/898,505
Amendment Dated March 24, 2004
Reply to Office Action of December 24, 2003

AMENDMENT TO THE CLAIMS:

The following listing of claims will replace all prior versions of claims in the application.

LISTING OF THE CLAIMS:

Claim 1 (currently amended): A device for vaporization injection of samples into a gas chromatography analysis instrument, comprising an elongated ~~and constantly~~ heated vaporization chamber having a lower portion that is constantly heated and having an upper portion, a syringe equipped with a needle that is arranged to inject a sample liquid through a tip of the needle to be released in a form of a liquid band into the upper portion where the released injected sample is maintained in the form of the liquid band, the device being configured to render vaporization of the sample liquid within the needle negligible, and further containing means for stopping and vaporizing the released sample liquid within the lower portion of the vaporization chamber and above a column entrance, characterized in that a distance between an exit the tip of the needle and the means for stopping and vaporizing the sample liquid above the column entrance is greater than 55 mm.

Claim 2 (original): A device according to claim 1, characterized in that said distance is greater than 80 mm.

Claim 3 (original): A device according to claim 1, characterized in that said needle extends into the vaporization chamber for length less than 30 mm.

Claim 4 (previously presented): A device according claim 1, characterized in that the internal channel of said needle has a diameter of less than 0.13 mm.

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Claim 5 (previously presented). A device according to claim 1, in which the upper portion of said vaporization chamber is cooled or unheated.

Claim 6 (previously presented) A device according to claim 1, in which the external wall of said needle is covered by a thermal insulating material.

Claim 7 (previously presented) A device according to claim 1, in which said needle is completely formed in a thermal insulating polymer.

Claim 8 (previously presented) A device according to claim 1, in which the complete length of said vaporization chamber is greater than 10 cm.

Claim 9 (original) A device according to claim 8, in which the complete length of said vaporization chamber is greater than 15 cm.

Claim 10 (previously presented): A device according to claim 1, in which said vaporization chamber is coiled.

Claim 11 (previously presented): A device according to claim 1, in which said vaporization chamber is formed in metal.

Claim 12 (previously presented): A device according to claim 11, in which the stated vaporization chamber is formed in "silcosteel".

Claim 13 (previously presented): A device according to claim 1, in which a conventional septum or a Merlin valve are able to be alternately mounted on the injector head.

Claim 14 (previously presented): A device according to claim 1, characterized in that said vaporization chamber has a restriction in its lower part containing said stop and vaporization means.

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Claim 15 (original): A device according to claim 14, characterized in that said restriction is connected to the upper part of the chamber by a funneled wall.

Claim 16 (previously presented): A device according to claim 1, characterized in that heating means for the vaporization chamber are provided operating at the vaporization temperature of the sample in correspondence to a restriction, and at a lower temperature in the upper part of the chamber than that in the lower portion of the chamber.

Claim 17 (currently amended): A vaporization method for a sample injected ~~via a syringe with a needle~~ into a constantly heated vaporization chamber of a gas chromatography analysis instrument, characterized in that said sample is injected through a tip of a needle of a syringe into ~~in~~ an upper portion of said vaporization chamber, and is released from the tip of the needle in a form of a liquid band crossing said vaporization chamber at a speed from the upper portion where the released sample is maintained in the form of the liquid band, to a lower portion of the vaporization chamber, and that said ~~liquid band~~ released sample is stopped by liquid stop means that is positioned above a column entrance and said released sample is vaporized in a the lower portion of the heated chamber, a distance between the tip of the needle and the liquid stop means being greater than 55 mm.

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Claim 18 (currently amended): A method according to claim 17, in which said needle is inserted into said chamber for a length not greater than 30 mm ~~and in such a way that the distance between the point of said needle and said liquid stop means is greater than 55 mm.~~

Claim 19 (previously presented): A device according to claim 1, in which heating means for the vaporization chamber are provided so as to achieve a maximum heating effect to vaporize all the sample towards the base of the chamber, and a lower temperature in the upper portion of the chamber.

Claim 20 (previously presented): A method according to claim 17, in which the lower portion of the chamber is heated to vaporize all the sample, and the upper portion of the chamber is operated at a lower temperature than that of the lower portion of the chamber.

Claim 21 (currently amended): A device for vaporization injection of a sample into a gas chromatography analysis instrument, comprising an elongated vaporization chamber, a syringe equipped with a needle to inject a liquid sample ~~within which is the sample that has not been vaporized~~, a stop and vaporization means ~~for stopping injection of~~ for arresting the injected liquid sample and for vaporizing same ~~vaporizing liquid of the sample~~ within the elongated vaporization chamber, means for heating at least part of the elongated vaporization chamber to a temperature above a vaporization temperature of the sample while a further part of the elongated vaporization chamber is maintains the injected liquid in a form of a liquid, a distance between a ~~free end tip~~ of the needle and the stop and vaporization means being greater than 55 mm.

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Claim 22 (previously presented): A device as in claim 21, further comprising heating means for the elongated vaporization chamber, the heating means being arranged and configured to vaporize all the sample towards a base of the elongated vaporization chamber and provide a temperature in an upper portion of the vaporization chamber that is lower than at a base.

Claim 23 (currently amended): A vaporization method for a sample injected ~~via a syringe with a needle~~ within a vaporization chamber of a gas chromatography analysis instrument, comprising heating at least a lower portion of the vaporization chamber to a temperature above a vaporization temperature of a sample to be analyzed, injecting through a tip of a needle of syringe the sample in correspondence with or in proximity of an upper portion of the vaporization chamber, releasing the sample from the tip of the needle in form of a liquid band crossing the vaporization chamber from the upper portion where the released sample is maintained in the form of the liquid band to the lower portion at a speed, stopping the liquid band released sample by liquid stop means that is positioned above a column entrance; and vaporizing the released sample in a the lower portion of the vaporization chamber, a distance between the tip of the needle and the liquid stop means being greater than 55 mm.

Claim 24 (previously presented): A vaporization method as in claim 23, wherein the heating of the lower portion of the chamber includes heating to vaporize all of the sample, further comprising operating at a lower temperature in an upper portion of the vaporization chamber than that within the lower portion of the vaporization chamber.